

Sustainable Waste Management Practices for Island Communities

"Thinking Outside of The Bin"

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Introduction

- Every civilization has had to develop Waste Management strategies and practices that were considered sustainable for their environment. From pre-historic times through the Roman era to our present, wastes generated by human activity and lifestyles require that it must be properly controlled, processed and disposed of, or we stand to be consumed by it.
- The most widely used practice of waste disposal has been land filling. Capacity for land fill management practice is largely promoted in countries that have huge land mass that can easily facilitate waste disposal by this method. However, Island communities are faced with increasing challenges due to insufficient land mass suitable for land filling.
- New waste regulations regarding E-Waste, Hazardous Waste, just to speak of those two streams, require that we must begin to "Think Outside of The Bin"

Bermuda

- Bermuda, like many islands around the world and particularly in the Caribbean, had to make a major change in how it managed its wastes. As a premier Tourist destination and a viable International Business Center, notwithstanding creating a healthy environment for its greatest asset, its people, sustainable waste management practices were introduced.

What are Bermuda's Waste Management Objectives?

- 
- An aerial photograph of a tropical island, likely in Bermuda, showing turquoise water, a small sandy beach, and a yellow boat. The island is surrounded by other smaller islands and reefs in the distance.
- *Safeguarding Bermuda's Environment*
 - *Handling Bermuda's Increasing Waste Disposal Needs*

Bermuda's Waste Management

Deficiency → *Necessity* → *Change* → *Innovation*

Limited Land
Area

Waste

Re-classification

Waste

Disposal

Management

Plan

Relevance

What we do with waste

Deficiency reveals Necessity
Necessity prompts Change
Change requires Innovation

Bermuda's Old Waste Management System



The Past

<i>Deficiency</i>	<i>Necessity</i>	<i>Change</i>	<i>Innovation</i>
<i>Limited Space</i>	<i>Waste Disposal</i>	<i>Re-classification</i>	<i>Waste Management Plan</i>

Bermuda's Present Waste Management System

Classification (Old) Classification (New) Local Processing End Point





Recycling Center
Glass, Alum., Steel



Marsh Folly
Organic Waste



Septage Plant
sewage

Tynes Bay
Burnable Waste



Current
Waste
Management
Plan



Airport
Metals and Ash Block



Sallyport
Hazardous Waste

Meeting New Waste Management

• *Safeguarding Bermuda's Environment*



Waste Disposal:

Option Two

If it can't be
Processed

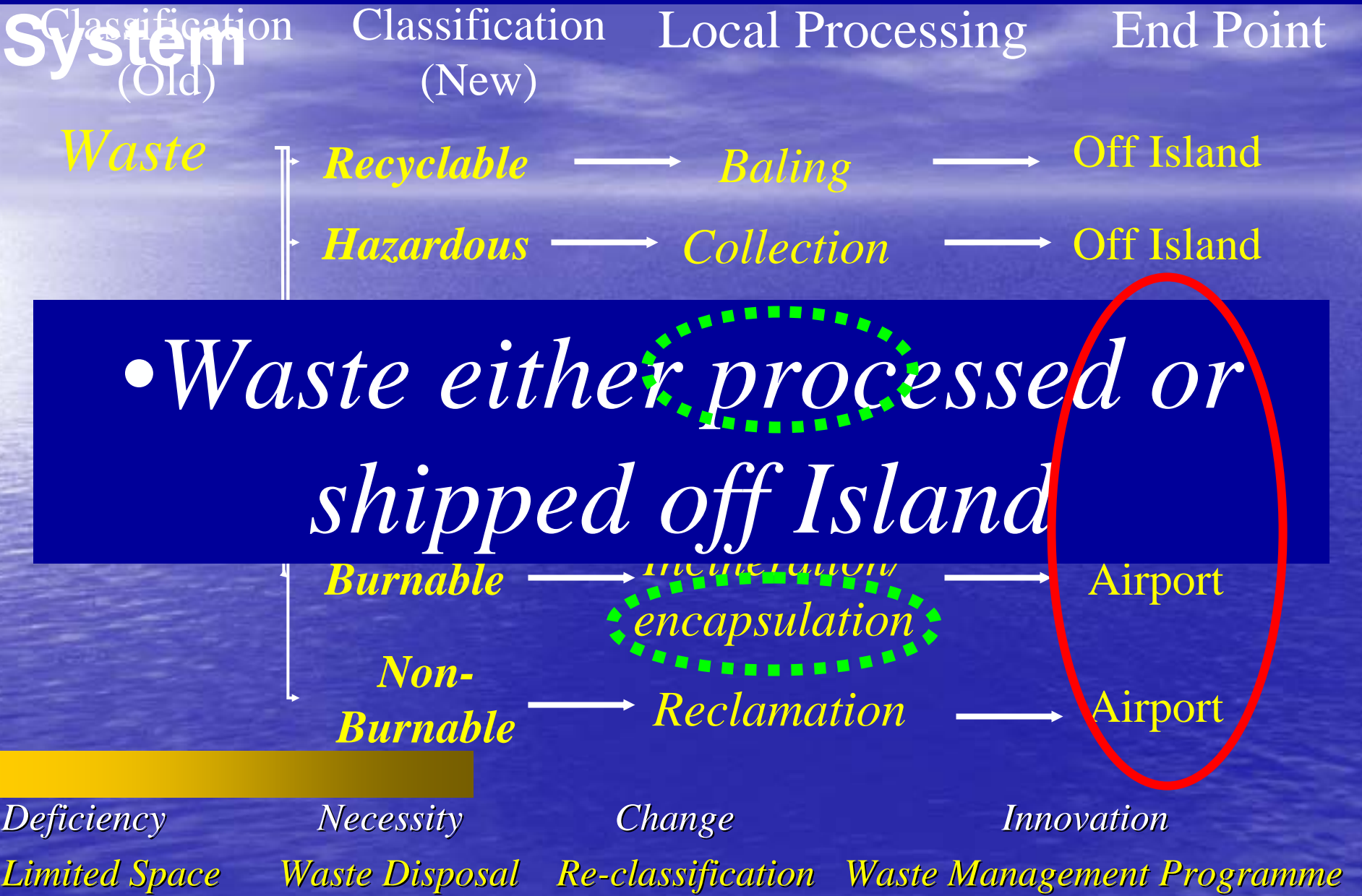
It must be
Removed

Only Two Options

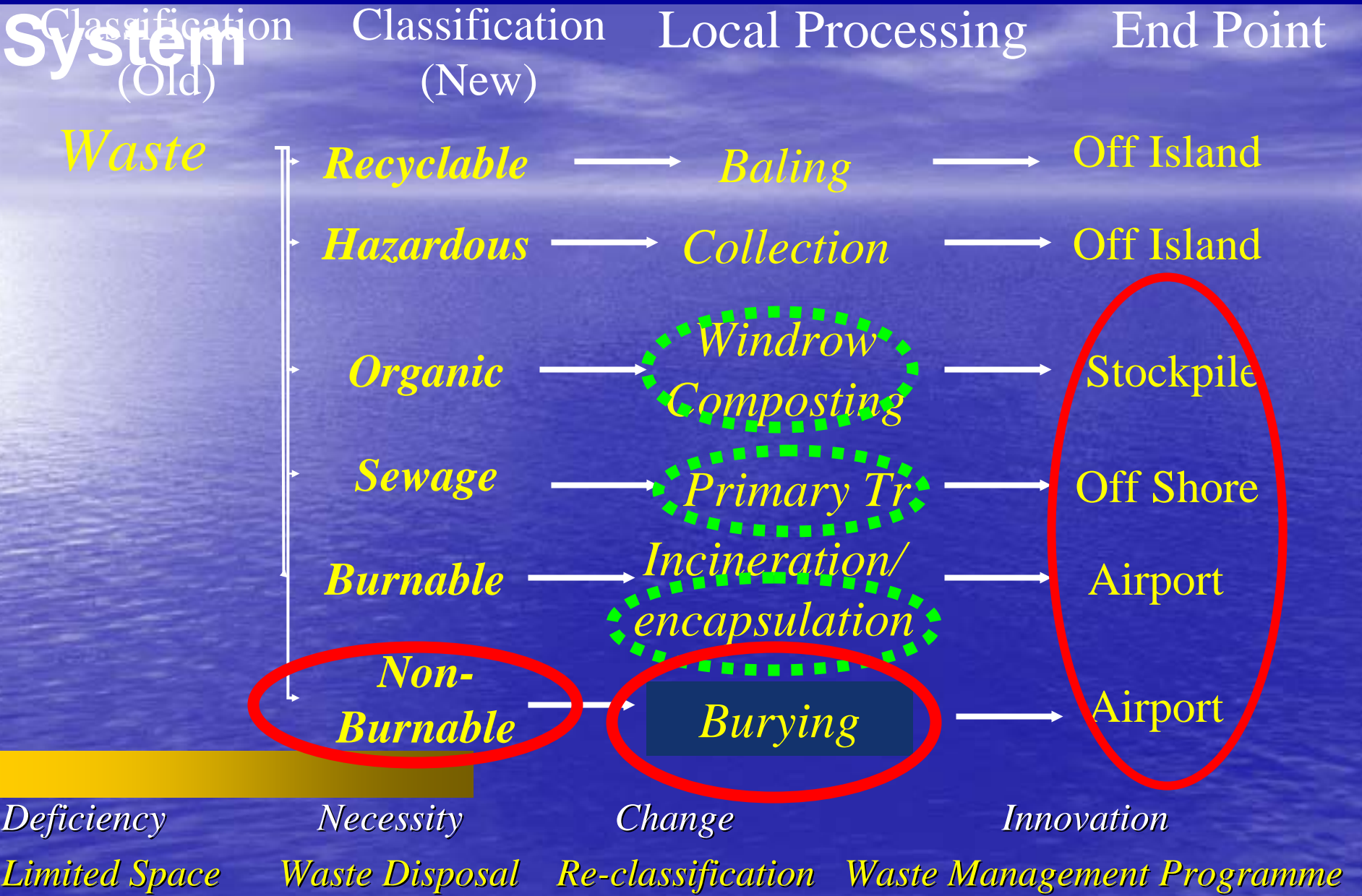
*Incinerated
Composted
Reused
Recycled*

*Collected
&
Shipped off
Island*

Bermuda's Present Waste Management System



Bermuda's Present Waste Management System



Re-Classification



Re-classification



<i>Deficiency</i>	<i>Necessity</i>	<i>Change</i>	<i>Innovation</i>
<i>Limited Space</i>	<i>Waste Disposal</i>	<i>Re-classification</i>	<i>Waste Management Programme</i>



Comprehensive

Waste

The Environment Management Plan

*Increase Capacity
at Tynes Bay*

*Ash
Aggregate
Plant*

*In-vessel
Composting
Plant*

*Upgraded
Recycling
Plant*

*Tire Baling
Plant*

*Upgraded
Sewage
Plant*

*Waste Metal
Programme*

*Electronic Waste
Programme*



- In-Vessel Composting
- Scrap Metal
- E-Waste
- Tyre Disposal
- Upgrade Recycling Plant
- Upgrade Sewage Disposal
- Ash Aggregate Plant
- Increased Capacity Tynes Bay

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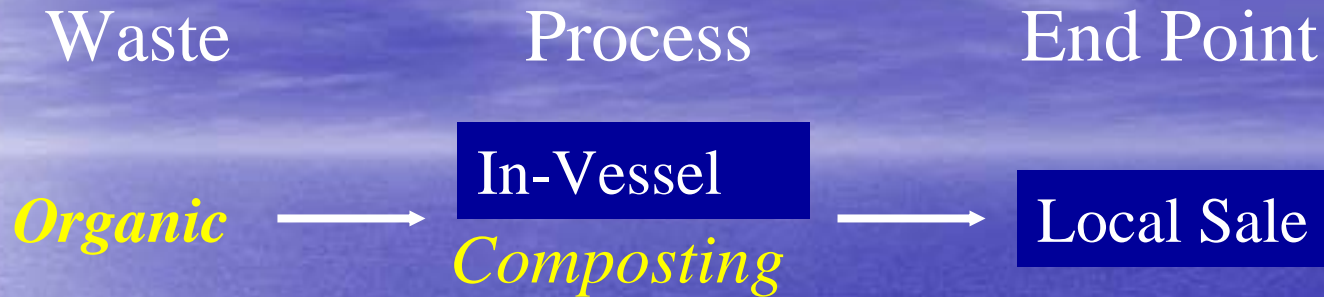
- Currently vehicles, white goods, and other scrap estimated at 8,000 to 10,000 tonnes per year of ferrous and non-ferrous metal disposed at Airport Waste Management Facility.
- Have met with potential contractors to ascertain recycling methods, markets and processing details and issues
- Considering space at Airport Site for pre-processing before O.S. shipment
- Will seek proposals for metal processing and recycling this year



E-Waste

- E-Waste including electrical appliances and tools, computers, televisions, cell phones, etc. due primarily to heavy metal content are not incinerated and are disposed at the Airport Facility.
- Have researched and sent test loads to markets in the US.
- Will perform due diligence on markets.
- Will develop programme based on a voluntary depot system this year.

System Expansions/Upgrades



Increased Capacity



<i>Deficiency</i>	<i>Necessity</i>	<i>Change</i>	<i>Innovation</i>
<i>Limited Space</i>	<i>Waste Disposal</i>	<i>Re-classification</i>	<i>Waste Management Programme</i>



Upgrade Recycling Plant

- New Facility commissioned in April 2007, capacity to sort all of Bermuda (blue bag) Tin, Aluminium and Glass.
- Tin and aluminium is baled and sold to US markets, glass is crushed into two sizes will be used locally as free-draining fill and possibly mixed into asphalt aggregate.
- Paper and Plastic are not included but sent to Tynes Bay for Waste to Energy (Green Energy)
- Devon Springs Facility retooled to serve as Waste Management Centre (public drop off for special waste, recyclables, re-use items, E-waste, compost bins, education, (potential deposit reclaim centre)



















Components
& Programmes



Tynes Bay Increase Capacity

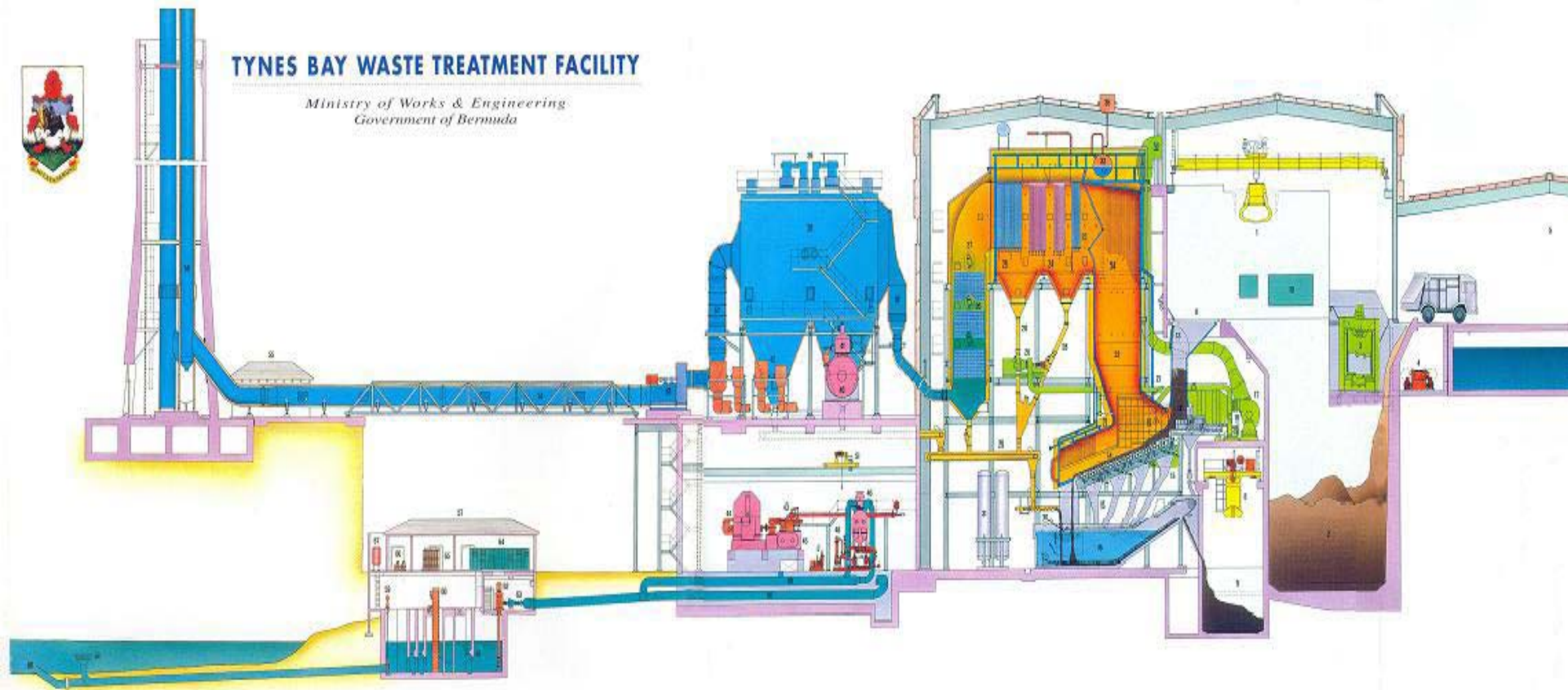
- Add plant redundancy
- Increase future capacity (waste and power generation)
- Incorporate latest technology
- Feasibility Study currently in progress
- Performed Health Risk Assessment of plant emission for last 10 years of operation.

Tynes Bay Waste Treatment Facility

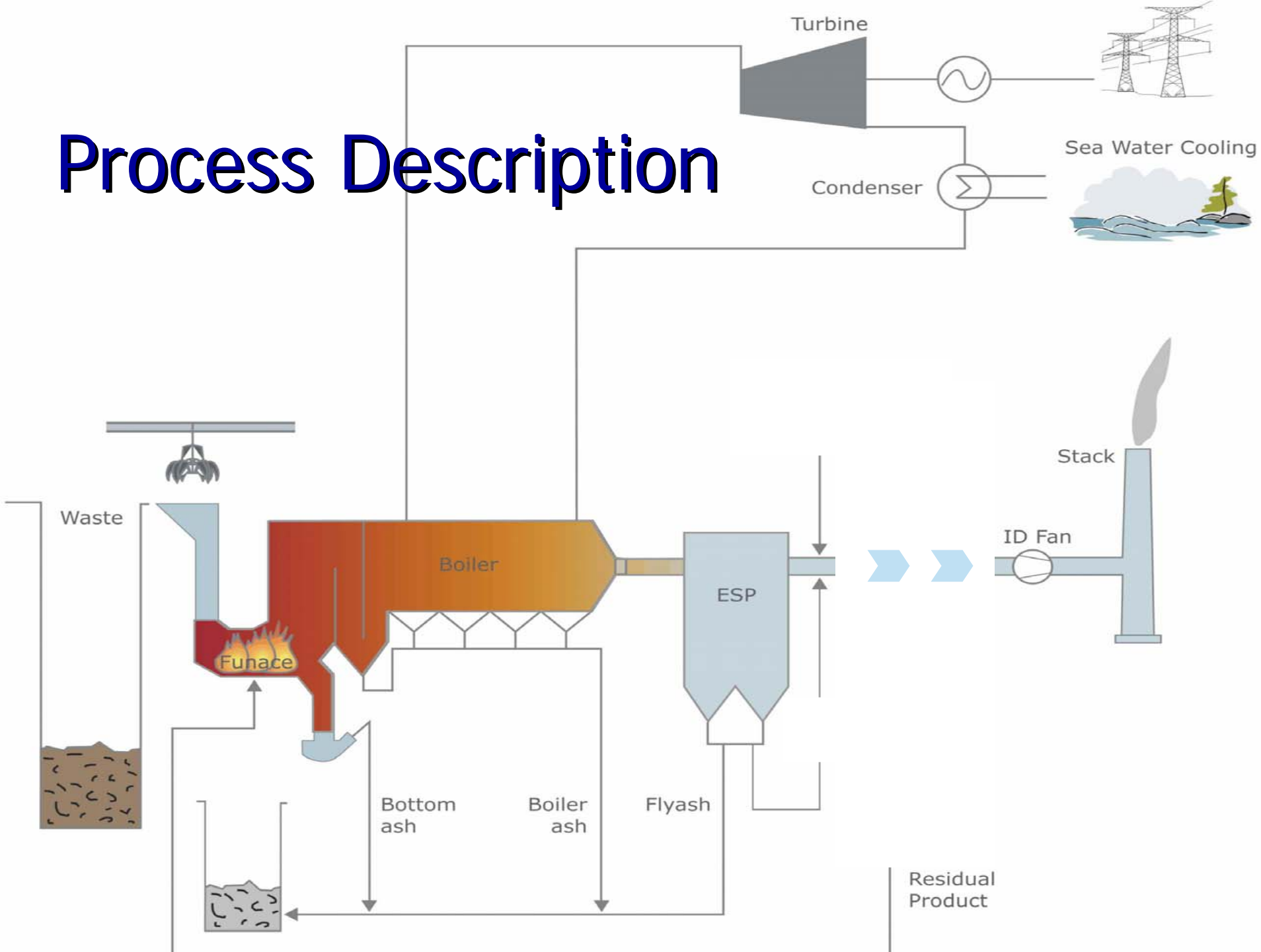
An aerial photograph of the Tynes Bay Waste Treatment Facility. The main building is a large, modern structure with a white roof and grey walls, situated on a green hillside. To the right, a tall, white, cylindrical smokestack rises into the sky. The facility is surrounded by lush green trees and vegetation. In the foreground, there is a body of water with a greenish tint. The background shows a residential area with houses on a hillside under a clear blue sky.

Plant commissioned May 1994

Plant Overview



Process Description



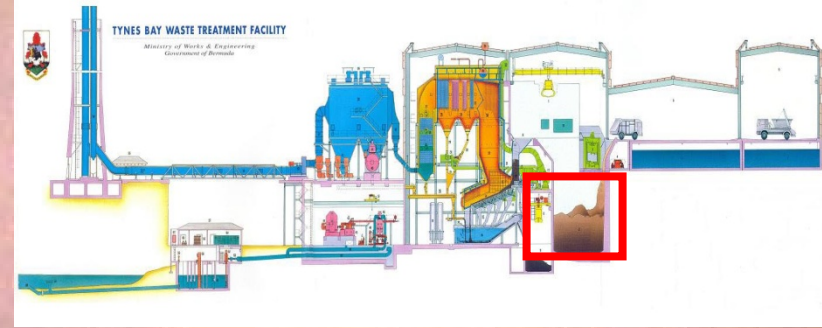
Weigh Bridge Station



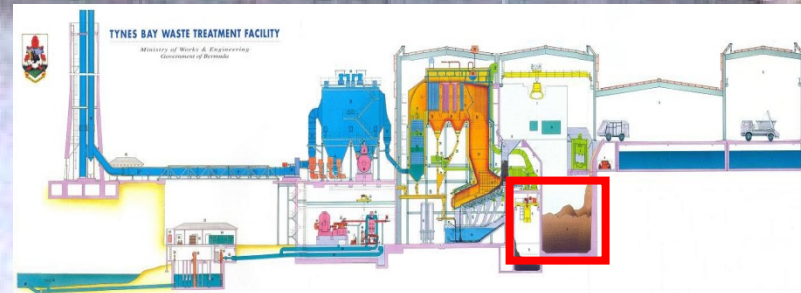
A photograph of a public drop-off area. In the foreground, there is a concrete building with a flat roof and a small, dark, recessed area on the left. To the right of this building is a larger, taller concrete structure with a white door. A green trash bin is visible near the white door. In the background, there is a chain-link fence topped with a white cap, and beyond that, more trees and a clear sky. The text "Public Drop Off" is overlaid in white on the right side of the image.

Public Drop Off

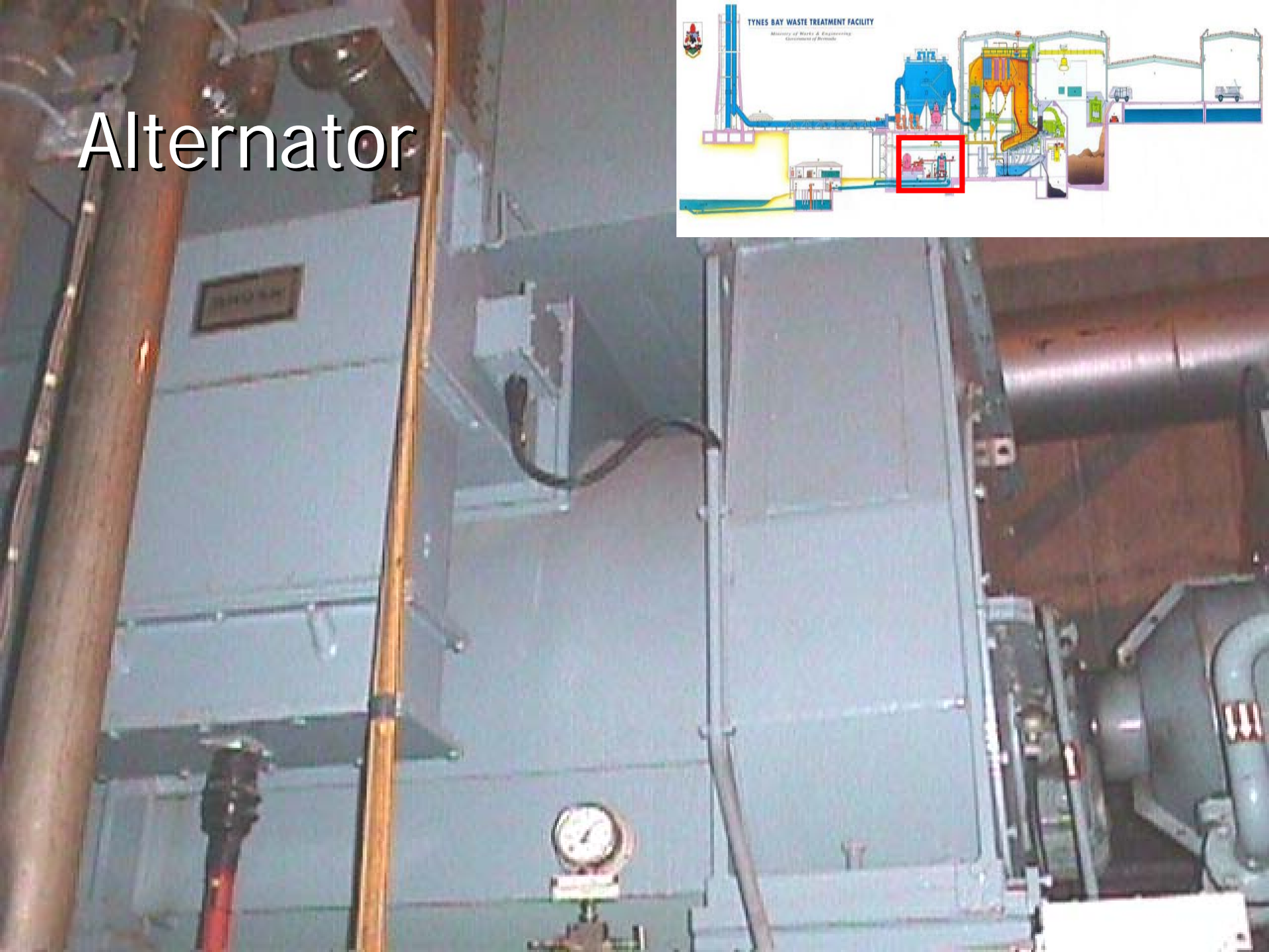
Refuse Bunker



Ash Plant



Alternator



Challenges

- Aging plant
- Increase in waste Generation
- Less opportunity for maintenance windows



Tynes Bay Facts

- Commissioned in 1994
- 65,000 metric tonnes of garbage per year
- Export 15 million kwh of electricity to Belco annually. 1400 homes.
- Produce 10,000 ash blocks